REMARKS

In the Office Action, claims 1-19 were rejected. All of the pending claims are believed to be allowable over the prior art reference. Reconsideration and allowance of all pending claims are respectfully requested in view of the arguments summarized below.

Rejections Under 35 U.S.C. § 102

In the Office Action, claims 1-5, 8-9 and 11-16 were rejected under 35 U.S.C. § 102(b) as being anticipated by Gosche, U.S. Patent No. 6,430,430. A *prima facie* case of anticipation under 35 U.S.C. § 102 requires a showing that each limitation of a claim is found in a single reference, practice or device. *In re Donohue*, 226 U.S.P.Q. 619, 621 (Fed. Cir. 1985). Applicants respectfully assert that the present invention, as recited in independent claims 1, 8 and 12 is patentable over the Gosche reference.

Claim 1 and the Claims Depending Therefrom.

Independent claim 1 recites classifying a plurality of selected structures based on a plurality of image processing computations relating respective T2 relaxation times corresponding to each of the structures, and segmenting the MR images for each of the structures substantially concurrently based on the plurality of image computations.

Applicants respectfully submit that, in the present application, the selected structures within the body of interest are classified and/or segmented based on image processing computations relating respective T2 relaxation times corresponding to each of the structures. The application discloses that the T2 value is useful in distinguishing selected tissue types in a MR image since there is a T2 value associated with a given tissue type or brain structure. Further, the given T2 value may be visualized differently between dual echo images. Each of the image processing computations defined in the present application such as a scatter plot (SP), a T2 radial histogram (RH), a T2 median filter, and a dual echo MIP filter is based on T2 values and other information relating to T2. Further,

applicants respectfully submit that, the MR images for each of the structures are segmented substantially concurrently based on the plurality of image computations, thereby reducing the image processing time.

The Gosche reference discloses standard data acquisition techniques for MRI such as proton density weighted ("PDw") data acquisition, a spin-lattice relaxation time ("T1s") data acquisition, and/or a spin-spin relaxation time ("T2w") data acquisition (*see,* column 50, lines 37-48, cited by the Examiner). This passage reads:

> Each MRI scan in the series includes one or more standard modalities or standard data acquisitions. For example, such standard data acquisitions include a proton density weighted ("PDw") data acquisition, a spin-lattice relaxation time ("T1s") data acquisition, and/or a spin-spin relaxation time ("T2w") data acquisition. Alternate standard acquisitions are acceptable. One of ordinary skill in the art will readily appreciate the trade-offs between the myriad factors associated with MRI brain scans including, but not limited to, the type of image to acquire, cost, time, resolution, slice thickness, distance between slices, and signal-to-noise ratios.

Additionally, Gosche also discloses segmentation and/or classification techniques using one or more knowledge rules (*see,* column 49, line 45-column 50, line 2, cited by the Examiner). The passage reads:

> In an embodiment of the instant invention, an automated, or computer-implemented, method of identifying suspected lesions in a brain is provided, by way of illustration, in FIG. 9. In Step S100, a processor or scanner provides a magnetic resonance image (MRI) of a patient's head, including a plurality of slices of the patient's head, which MRI comprises a multispectral data set that can be displayed as an image of varying pixel or voxel intensities. In Step S110, the processor identifies a brain area within each slice to provide a plurality of masked images of intracranial tissue. In Step S120, the processor, applies a segmentation technique to at least one of the masked images to classify the varying pixel intensities into separate groupings, which potentially correspond to different tissue types. In Step S130, the processor refines the initial segmentation into the separate groupings of at least the first masked image obtained from Step S120 using one or more knowledge rules that combine pixel intensities with spatial relationships of anatomical structures to locate one or more anatomical regions of the brain. In Step S140, the processor identifies, if

> present, the one or more anatomical regions of the brain located in Step S130 in other masked images obtained from Step S120. In Step S150, the processor further refines the resulting knowledge rule-refined images from Steps S130 and S140 to locate suspected lesions in the brain.

However, Gosche fails to disclose that such classification and/or segmentation can be done *based on T2 relaxation times*. The former passage simply discloses standard acquisition protocols while the latter passage discloses classification and segmentation based on "knowledge rules". However, there is no basis whatsoever to conclude that the "knowledge rules" should or could be based on T2 relaxation times.

Moreover, Gosche reference fails to disclose concurrent segmentation of MR images. The Examiner relied upon a passage from Gosche to support this rejection. The passage reads:

> Optionally, the at least one imaging scan includes a plurality of consecutive imaging scans. Optionally, the processor (b) identifies a location of each cerebral region of the at least one cerebral region in a successive imaging scan of the plurality of imaging scans based, at least in part, on a location of a corresponding cerebral region in a preceding imaging scan of the plurality of imaging scans, the identifying step (b) is free of human intervention and/or is automatic. Optionally, the processor (c) determines a volumetric measurement for at least one of the cerebral regions. (*see,* column 10, lines 39-49)

The passage clearly does not support any contention that the processing in Gosche is concurrent. One skilled in the art would just as readily conclude that the processing as described in Gosche is sequential. At the very least, the reference does not support the Examiner contention.

At least because Gosche do not disclose or suggest classification and/or segmentation techniques based on T2 relaxation times or the concurrent segmentation of MR images as claimed, the reference cannot support a *prima facie* case of anticipation of claim 1. Claims 2-5 depend directly or indirectly from claim 1. Accordingly, the

Applicants submit that claims 2-5 are allowable by virtue of their dependency from an allowable base claim. Applicants also submit that the dependent claims are further allowable by virtue of the subject matter they separately recite. Thus, it is respectfully requested that the rejection of claims 1-5 under 35 U.S.C. §102(b) be withdrawn.

Claim 8 and the Claims Depending Therefrom.

Independent claim 8 recites computing a plurality of image processing computations relating respective T2 relaxation times corresponding to each of a plurality of selected structures within the brain and segmenting the MR images for each of the structures substantially concurrently based on the plurality of image computations.

Applicants respectfully submit that, in the present application, the selected structures within the brain are segmented based on image processing computations relating respective T2 relaxation times corresponding to each of the structures. Additionally, the MR images are segmented substantially concurrently for each of the structures. As discussed above, the Gosche reference fails to disclose classification and/or segmentation based on T2 relaxation times. Further, Gosche reference fails to disclose concurrent segmentation of MR images.

At least because Gosche do not disclose or suggest classification and/or segmentation techniques based on T2 relaxation times or the concurrent segmentation of MR images as claimed, the reference cannot support a *prima facie* case of anticipation of claim 8. Claims 9 and 11 depend directly or indirectly from claim 8. Accordingly, the Applicants submit that claims 9 and 11 are allowable by virtue of their dependency from an allowable base claim. Applicants also submit that the dependent claims are further allowable by virtue of the subject matter they separately recite. Thus, it is respectfully requested that the rejection of claims 8-9 and 11 under 35 U.S.C. §102(b) be withdrawn.

Claim 12 and the Claims Depending Therefrom.

Independent claim 12 recites a processor adapted to perform concurrent segmentation computations for a plurality of selected structures.

As discussed above, the Gosche reference fails to disclose concurrent segmentation for a plurality of selected structures as claimed. Accordingly, the reference therefore cannot support a *prima facie* case of anticipation of claim 12. Claims 13-16 depend directly or indirectly from claim 12, and are allowable by virtue of their dependency from an allowable base claim. Applicants also submit that the dependent claims are further allowable by virtue of the subject matter they separately recite. Thus, it is respectfully requested that the rejection of claims 12-16 under 35 U.S.C. §102(b) be withdrawn.

Rejections Under 35 U.S.C. § 103

Claims 6-7, 10 and 17-19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gosche in view of Udupa, U.S. Patent No. 5,812,691.

As discussed above, the Gosche reference does not teach, suggest or disclose each and every aspect of Applicants' invention as recited in the independent claims 1 and 8. Applicants further note that Udupa does nothing to obviate the deficiencies of Gosche discussed above. Therefore, because claims 6-7 and 10 depend directly or indirectly from claims 1 and 8 respectively they are allowable by virtue of such dependency, as well as for the subject matter they separately recite. Thus, it is respectfully requested that the rejection of claims 6-7 and 10 under 35 U.S.C. §103(a) be withdrawn.

Claim 17 and the Claims Depending Therefrom.

Independent claim 17 recites a method for filtering dual echo images acquired by MR imaging. The method includes selecting a desired echo, implementing a maximum intensity projection (MIP) on the selected echo, and identifying a spatial location of the

implemented MIP. The spatial location is then used to extract values from subsequent echoes.

The Examiner recognized that Gosche reference fails to disclose the use of maximum intensity projections. However, the Examiner argued that Udupa in same field of medical diagnostic systems teaches a method of visualizing the vessels via 3D renditions created by MIP. Even if this were true, neither reference, alone or in combination, teaches or suggests use of MIP *for filtering dual echo images*. On the contrary, the Gosche reference would lead person skilled in the art to believe that there is no need to resort to other techniques, such as MIP. Gosche discloses many filtering techniques such as ANN based filtering, 3D diffusion filtering, 3D anisotropic diffusion filtering for removing artifacts, correcting inhomogeneity and improving signal to noise ratio.

Furthermore, Udupa does mention the use of MIP as well as certain MR pulse sequences. However, these are disclosed in completely separate examples and are never combined. Indeed Udupa states:

> A problem with MIP is that it is accompanied by considerable clutter, and since there is no model of reflection, aspects of the vessels at different distances with respect to the viewpoint are not distinguished easily. This leads to some confusion in stationary views. However, based on over 10 patient studies conducted so far, 3-fuzzy object extraction using Algorithm .kappa.FOE seems to be an effective solution to extract vessels in MRA. (*see,* column 20, line 63-column 21, line 3)

Significantly, this algorithm, said to solve problems with MIP, is not the same algorithm as the one used for MR sequences (*see,* column 21, line 63-column 22, line 12). Clearly, then, even Udupa does not suggest mixing these techniques.

Hence the Gosche and Udupa references, alone or in combination, do not teach, suggest or disclose each and every aspect of the invention as recited in the independent

claim 17. The reference therefore cannot support a *prima facie* case of obviousness of claim 17. Claims 18-19 depend directly or indirectly from claim 17. Accordingly, Applicants submit that claims 18-19 are allowable by virtue of their dependency from an allowable base claim. Applicants also submit that the dependent claims are further allowable by virtue of the subject matter they separately recite. Thus, it is respectfully requested that the rejection of claims 17-19 under 35 U.S.C. §103(a) be withdrawn.

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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